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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOK KET NO	CONFIRMATION NCL
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09/759,899

01/12/2001

I. T. Chen

JCTWP020A

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EXAMINER

ARMED, SRANIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 03/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.	Applicant(s)
09/759,899	CHEN ET AL.
Examiner	Art Unit
Shamim Ahmed	1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133)
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(g).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 5, 6 and 11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5, 6 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftperson's Patent Drawing Review (PTO-945)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 3/22/04 have been fully considered but they are not persuasive. Applicants argue that Zhao et al teach a method of forming patterns on a layer of metal based compound but not silicon-containing material.

In response, examiner states that the argument is not persuasive because Zhao et al teach that several layers of different material are deposited in order to form integrated circuits (col.1, lines 10-11) and also teach that unwanted oxide such as silicon oxide is formed on the exposed surface of the integrated circuit during the removal process of photoresist and the integrated circuit includes silicon-containing layer as shown in col.2, lines 66-col.3, line 2 (also, see col.1, lines 52-56, figure 1).

Therefore, the substrate is silicon-containing material but not limited to a metal layer.

Applicants argue that Zhao et al do not teach an overetch process of the silicon-containing layer using an inert gas plasma to remove a remaining of the photoresist layer and to treat the silicon oxide material.

Applicants also argue that the silicon oxide is resulted from a reaction between the silicon-containing material and the oxygen plasma.

In response, examiner states that Zhao teaches that the initial removal of the photoresist using wet etching process or other methods of photoresist removal and remaining undesirable residues including remaining photoresist and silicon oxide formed on the exposed part of the substrate containing silicon, which remaining

photoresist and silicon oxide can be plasma cleaned by using argon ion bombardment (col. 1, lines 54-67).

Examiner also states that the unwanted silicon oxide is form on the exposed surface of the integrated circuit substrate with the reaction of silicon-containing material layer on the exposed surface and oxygen plasma used to remove photoresist as taught by modified Zhao et al.

Therefore, Zhao's plasma cleaning process using inert gas plasma such as argon plasma is nothing but an overetching process of the integrated circuits including the silicon-containing layer.

Applicants further argue that Sun fails to teach using non-oxygen plasma to remove unwanted particles.

In response to the argument, examiner states that Sun is applied to modify Zhao et al by replacing wet stripping of photoresist with art recognized oxygen plasma for easily removing the bulk photoresist with an advantage of reducing process cost over an wet etching (see the rejection).

Therefore, the rejection of the previous office action is repeated herein.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 5-6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al (5,660,682) in view of Sun et al (5,674,357).

As to claims 5-6, Zhao et al disclose a cleaning process of an integrated circuit device, wherein a majority of photoresist is removed by conventional method such as wet or dry etching process (col.1, lines 30-43).

Zhao et al also disclose that the photoresist removal process form undesirable material such as silicon oxide on the exposed surface of the silicon substrate and residual polymeric photoresist (col.1, lines 54-63).

Zhao et al further disclose that the undesirable material and the residual photoresist are removed or cleaned using plasma cleaning with an inert gas plasma such as argon plasma (col.1, lines 64-67 and col.2, lines 66-col.3, lines 32), which reads on applicant's limitation of "an overetch process using an inert gas plasma to remove a remaining of the photoresist layer and to treat the silicon oxide material".

Zhao et al remain silent about the majority of photoresist is removed by oxygen plasma.

However, in a method of removing photoresist, Sun et al teach that oxygen plasma is conventionally used to remove majority of photoresist for reducing the processing cost because the oxygen plasma is art recognized process (col.7, lines 64-col.8, lines 5).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Sun et al's oxygen plasma into dry etching of Zhao et al's process for reducing the processing cost because the oxygen plasma is an art recognized process for easily removal of photoresist as taught by Sun et al.

As to claim 11, Zhao et al teach that the overetch or the plasma cleaning process comprises an ion bombardment of the argon ions (col.1, lines 64-67).

#### ***Conclusion***

**5. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1765

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shamim Ahmed  
Examiner  
Art Unit 1765

SA  
May 19, 2004

NADINE G. MORTON  
SUPERVISOR, PATENT EXAMINER

